Title: Infrared Imaging Polarimetry of Comets
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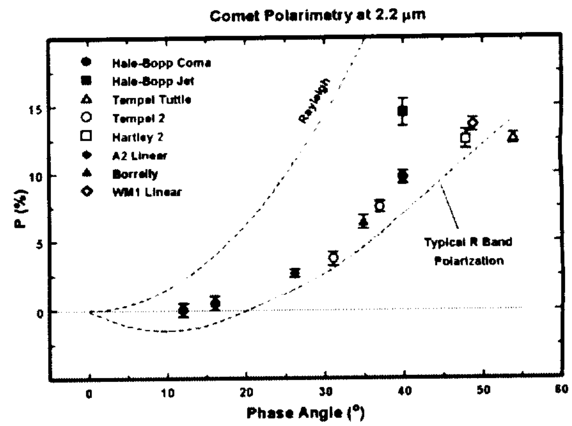
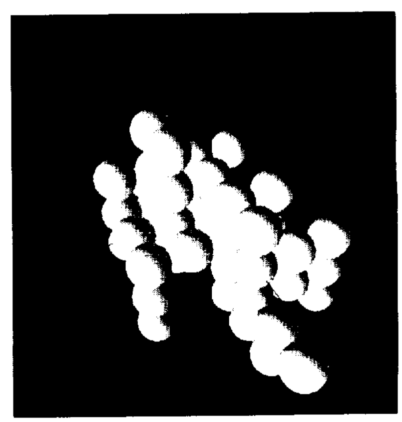
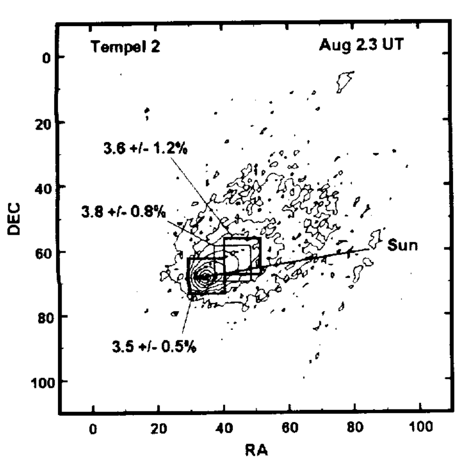
During the 3 years of funding under this grant the Minnesota IR Group studied a number of comets using Infrared imaging polarimetry. We also initiated a theoretical program to model our observational results.



At right is a plot of our measured polarization at K (2.2 microns) for seven comets vs. the comet's solar phase angle. The dashed line illustrates the typical behavior of comets in the R (0.7 micron) band. Note that the IR polarization, although at over 3 times longer in wavelength, is only a percent or two higher. In fact, we have found that the polarization of comets in nearly flat with wavelength from the near UV to 2.2 microns, a factor of 8 in wavelength!



We have started an effort to model comet grains with the goal of matching the nearly flat wavelength dependence of the polarization, yet preserving the 'fluffy aggregate' model in its general characteristics. At right is an image of a 'grain' generated by a computer code that creates a series of randomly generated grain aggregates, and then uses the T-Matrix method to compute the polarization characteristics of the scattered light. The goal is to see if this ensemble of grain aggregates can simultaneously reproduce the negative branch, the level of polarization, and the wavelength dependance.



Finally, by using imaging polarimetry, we can investigate how the grain properties vary across the coma. For Hale-Bopp, the polarization in the jet was significantly higher than in the general coma. This demands a very much smaller grain size distribution in the jet. For Tempel 2, pictured at left, the polarization in the coma and in the tail are the same. This comet is believed to produce very large grains than slowly separate from the comet with time, consistent with our polarization results.

Papers published with full or partial support of the grant.

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